CLAIMS

We claim:

1. An implantable medical device comprising:

a housing surrounding at least one circuit;

an inverted-f antenna extending along the housing, the antenna electrically coupled to the at least one circuit; and

a coating covering at least a portion of the housing and at least a portion of the inverted-f antenna.

2. The device of claim 1 wherein the housing is formed of a conductive material.

3. The device of claim 2 wherein a portion of the inverted-f antenna extends along an outer section of the housing.

4. The device of claim 3 wherein the portion of the inverted-f antenna extending along the outer section of the housing is curvilinear in shape and approximately follows the outer section of the housing.

5. The device of claim 4 wherein the curvilinear portion of the inverted-f antenna is operable to broadcast a signal with multiple polarizations.

6. The device of claim 1 wherein the inverted-f antenna includes a shunt arm, and wherein the shunt arm is shorted to the housing.

7. The device of claim 1 wherein the inverted-f antenna includes a shunt arm, and wherein the shunt arm is capacitively coupled to the housing.

8. The device of claim 1 wherein a portion of the inverted-f antenna operates as both an electrode and as a wireless transmission element.

9. The device of claim 8 wherein the implantable medical device is a pacemaker, and wherein the portion of the inverted-f antenna is operable in conjunction with other electrodes associated with the pacemaker to generate an electrocardiogram.

10. The device of claim 1 wherein the housing includes a header, wherein a portion of the inverted-f antenna extends along an outer section of the housing away from the header.

11. The device of claim 10, wherein a leg of the inverted-f antenna is coupled to the housing at a location away from the header.

12. The device of claim 1 wherein at least a portion of the inverted-f antenna is encapsulated in a polymer.

13. The device of claim 1 wherein the coating comprises a polymer.

14. The device of claim 13 wherein a dielectric constant of the polymer and a thickness of the polymer measured from the housing to a location on the inverted-f antenna at least partially defines an operational characteristic of the inverted-f antenna.

15. The device of claim 1 wherein the inverted-f antenna is tailored for dual frequency band operation.

16. The device of claim 15 wherein one of the frequencies included in the dual frequency band operation is selected for use in a first geopolitical region, and the other of the frequencies included in the dual frequency band operation is selected for use in a second geopolitical region.

17. The device of claim 1 wherein the inverted-f antenna is a three-dimensional inverted-f antenna.

18. The device of claim 17 wherein the three-dimensional inverted-f antenna comprises wire, and wherein the wire includes a metal selected from a group consisting of: platinum, stainless steel, irridium, niobium, gold and silver core stainless steel.

19. The device of claim 1 wherein the housing includes a side, a front, and a back; wherein deployment of the implantable medical device includes placing the implantable medical device within a human being such that the front faces the anterior of the human being and the back faces the posterior of the human being, and wherein the inverted-f antenna is disposed along the side of the implantable medical device.

20. An implantable medical device, the device comprising:

a means for containing an electrical circuit, wherein the means for containing includes a side, a front and a back, and wherein the front is deployed toward the anterior of a human body when the implantable medical device is deployed;

a means for transmitting and receiving wireless information, wherein the means for transmitting and receiving wireless information extends along less than one half of the side of the means for containing; and

a human body compatible means for protecting the exterior of the implantable medical device.

21. The implantable medical device of claim 20 wherein the means for transmitting and receiving wireless information is an inverted-f antenna.

22. The implantable medical device of claim 21 wherein the inverted-f antenna is a non-planar inverted-f antenna.

23. The implantable medical device of claim 20 wherein the means for transmitting and receiving wireless information includes an antenna and an antenna tuning circuit for matching the impedance of the antenna to the electrical circuit at a specified frequency of the radio-frequency carrier.

24. The implantable medical device of claim 23 wherein the antenna tuning circuit comprises a variable tuning capacitor for adjusting the resonant frequency of the antenna.

25. The implantable medical device of claim 20 wherein the electrical circuit includes a cardiac rhythm management circuit electrically coupled to one or more electrodes adapted for disposition within or near the heart by one or more therapy leads.

26. A device comprising a housing including a header, the housing surrounding at least one electrical circuit, and an antenna including a feed line electrically coupled to the electrical circuit, wherein a length of the antenna extends along an outer surface of the housing away from the header.

27. The device of claim 26 wherein the antenna is an inverted-f antenna.

28. The device of claim 26 wherein the housing includes a feed through, and wherein the feed line passes through the feed through.

29. The device of claim 26 wherein the at least one electrical circuit is operable to perform a function selected from the group consisting of: receive a signal from the antenna, and transmit a signal to the antenna.

30. The device of claim 26 wherein the housing is conductive, wherein the length of the antenna extending along the outer surface of the housing is encapsulated in a coating, and wherein the coating forms a dielectric barrier between the conductive housing and the length of the antenna extending along the outer surface of the housing.

31. The device of claim 30 wherein the distance from the antenna to the conductive housing is approximately equal along the length of the antenna extending along the outer surface of the housing.

32. The device of claim 26 wherein the device is an implantable pacemaker; wherein the housing includes a side, a front, and a back; wherein deployment of the implantable pacemaker includes placing the implantable pacemaker within a human being such that the front faces the anterior of the human being and the back faces the posterior of the human being, and wherein the inverted-f antenna is disposed along the side of the implantable pacemaker.

33. A method for manufacturing an implanted medical device, the method comprising:

providing a conductive housing surrounding at least one electrical circuit, wherein the conductive housing includes a front, a back, and a side, and wherein the implantable medical device when deployed within a living being is oriented such that the front faces the anterior of the living being and the back faces the posterior of the living being;

providing an antenna, wherein the antenna includes a feed line and a shunt line, wherein the at least one electrical circuit is electrically coupled to the feed line;

extending a dielectric compartment along the side of the conductive housing; and

embedding the antenna within the dielectric compartment, wherein the antenna extends along and displaced from the side of the conductive housing.

34. The method of claim 33 wherein the conductive housing includes a side, a front, and a back; wherein the deployed medical device is disposed within the living being such that the front faces the anterior of the living being and the back faces the posterior of the living being; wherein the length of the antenna extends along the side of the housing; and wherein placing the external programmer in relation to the deployed medical device includes placing the external programmer in a location selected from a group consisting of: a location displaced from the anterior of the living being, a location displaced from the posterior of the living being, and a location displaced from the side of the living being.

35. A method for programming a medical device, the method comprising:

programming the implantable medical device using an external programmer, wherein the implantable medical device includes an inverted-F antenna, and wherein programming the implantable medical device includes disposing the implantable medical device relative to the external programmer at a distance sufficient to eliminate the need for sterilization of any portion of the external programmer.

36. The method of claim 35 wherein programming the implantable medical device is performed at a frequency selected from the group consisting of: about 400-450 MHz, about 862-870 MHz, and about 902-928 MHz.